as long, slightly narrowed in front; sides arcuate, acutely toothed at the anterior angles, with a row of coarse punctures inside the strongly reflexed margin; disc convex, polished, with very sparse minute punctures; the antebasal transverse impression deep, coarsely punctate along its posterior margin, the longitudinal impressions deep, short, between the antebasal and the basal grooves. Elytra at base broader than thorax, slightly rounded at the sides; umbone prominent; disc feebly convex, with a long scutellar and nine discal striæ of moderately closely placed punctures, coarser at the base but gradually finer toward apex; intervals nearly smooth, the eighth with an obtuse carina from the umbone to near the apex. Prosternum sparsely punctuate in front, coarsely rugose between the coxæ. Abdomen with sparse setiferous punctures. Length, 3 mm.

One example from Round Knob, North Carolina, in the collection of Messrs. Hubbard and Schwarz.

BRACHYCORYNA PUMILA Guérin.

Brachycoryna pumila Guérin, Ic., Regn. Anim., Ins., p. 280.—Dejean, Cat., 3d ed., p. 390.

Octotoma pumila Gemminger et Harold, Cat. 12, p. 3610.

In Biologia Centrali-Americana this species is recorded from Mexico, Central America, and Colombia, and Professor C. H. T. Townsend has collected it in Brownsville, Texas. It is smaller and more depressed than *Stenopodius flavidus;* the antennæ, head, and ventral surface are deep black, dorsal surface and legs pale yellow, sparsely maculate with black; elytra with four narrow elevated carinæ and ten rows of deep punctures. The antennæ are short, strongly clavate, the apex of the thorax not produced and the third tarsal joint bifid.

NOTES ON A COLLECTION OF FISHES FROM THE COLORADO BASIN IN ARIZONA.

By Charles Henry Gilbert,
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and
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During the latter half of April and the early part of May, 1890, the senior author and Mr. A. B. Alexander, of the United States Fish Commission, were temporarily detached from the "Albatross" and assigned to special duty in Arizona. The principal object of the expedition was to investigate the alleged occurrence of shad in the Lower Colorado, where it had been planted several years before by the United States Fish Commission. It was soon ascertained that the reports of the capture of shad had been erroneous, the fish in question being the German carp, then a stranger in the Colorado River. Repeated trials of the shad net and seine at Yuma, and later in the Horseshoe Bend of the Colorado below Lerdo, Mexico, failed to demonstrate the presence of shad. The river seems entirely unsuited to it.

Collections of the native fishes were made in the Colorado and in the mouth of the Gila River at Yuma; in the Salt River from Tempé to near the mouth of the Rio Verde, and in the upper course of the Rio Verde at Chino. The commoner species are well represented in the collection, and in addition such desiderata as *Plagopterus argentissimus*, *Meda fulgida*, a new species of *Pantosteus*, and, most important of all, *Tiaroga cobitis*, known heretofore only from the types, discovered in 1851. We secured all the species credited to the Lower Colorado and Gila rivers excepting of *Pantosteus clarki* and *Catostomus insignis*.

In their excellent historical account and check-list of the fishes of the Colorado River,[1] Evermann and Rutter call attention to the fact that a remarkably high percentage of its fishes are peculiar to the Colorado Basin. This becomes still more striking when we examine the short list (seven species in all) supposed by them to be found in other basins as well. For of these seven, two must be eliminated: *Lepidomeda vittata* and *Cyprinodon macularius*. *L. vittata* was, it is true, taken in southwestern Arizona by the Death Valley Expedition, but the river in

[1] Bull. U. S. Fish Commission, XIV, 1894, pp. 475–486.

which it was found is properly a tributary of the Rio Virgen, though now lost in the desert sands before reaching that stream. *C. maculatus* is known from the Colorado River, and also from springs in the great Colorado Desert. So far as known to us, it occurs only where the natural drainage is toward the Colorado River. Of the remaining five species, three are of very wide distribution, seemingly able to set at defiance what are effective barriers to the dispersion of other fishes. By virtue of what special characteristics they accomplish this result we do not know. Their testimony must for the present be simply ignored in any discussion of faunal relations. The case is different with one of the remaining species, *Leuciscus lineatus*, which is common to mountain tributaries of the Colorado and to the Utah Basin. Its occurrence in the Colorado is an unexplained anomaly, and contradicts all the other facts, which bespeak a very long period of absolute isolation for the Colorado Basin and its fauna. The last of the list, *Agosia chrysogaster*, was described from the Rio Santa Cruz, Sonora, Mexico, a tributary of the Gila. In a recent paper on the fresh-water fishes of Sonora by Rutter[1] it is listed, together with *Pœcilia occidentalis*, from the Rio Sonora and the Yaqui, which flow independently into the Gulf of California. These Gulf streams are practically unexplored, and may or may not prove to have had a comparatively recent connection with the Lower Colorado.

For the sake of completeness we include in this paper two undescribed species of marine fishes taken at the mouth of the Colorado. *Gillichthys detrusus* enters the river, and lives in salt or brackish water. Like its California congener, *G. mirabilis*, it sustains immersion in fresh water without apparent inconvenience.

Family CATOSTOMIDÆ.

1. PANTOSTEUS ARIZONÆ Gilbert, new species.

(Plate XXXVI.)

Four specimens of this species were taken at Tempé, Arizona. It is readily distinguished from all other species of *Pantosteus* by the large size of its scales.

Head broad and flat, $4\frac{1}{2}$ in length. Interorbital space flattened or very slightly concave, $2\frac{6}{10}$ in head. Depth $4\frac{3}{4}$; D. 11 or 12; A. 7; scales 7 or 8—65 to 67—11 to 15. The scales are unusually large in front of dorsal and along back, much smaller along lateral line, and become minute on belly. Those along the lateral line grow gradually larger posteriorly. Eye moderate, very high up, posterior, $3\frac{1}{3}$ in snout, 6 in head, $2\frac{1}{2}$ in interorbital space; orbital ring somewhat raised. Preorbital less than half as wide as long. Snout considerably longer than rest of head. Isthmus very broad, $2\frac{1}{2}$ in head. Greatest depth

[1] Proc. Cal. Acad. Sci., 1896, p. 260.

of head $1\frac{1}{2}$ in its length. Fontanelle obliterated, the bone covering it very thin. Mouth very broad, its width contained $3\frac{1}{5}$ times in length of head. Lips large, papillose. Lower lip broadly V-shaped behind, but slightly incised, a broad but shallow notch at junction of edge of upper and lower lips. Upper edge of dorsal straight; front of dorsal midway between tip of snout and base of caudal; pectorals $1\frac{1}{10}$ in head; ventrals $1\frac{3}{10}$; anal reaching base of caudal, $1\frac{1}{10}$ in head; caudal peduncle $1\frac{1}{4}$ in head, its least depth $2\frac{1}{5}$ in head or slightly more than 2 in its own length.

A preliminary account of this species has been given by Jordan & Evermann.[1]

Table of measurements.

Length in inches.	Head.	Depth.	D.	A.	Eye in head.	Eye in snout.	Eye in interorbital.	Scales.	Depth of head in its length.	Length of L. dorsal into head.	Depth of caudal peduncle into head.
9	$4\frac{1}{5}$	5	11	7	6	$3\frac{1}{2}$	$2\frac{1}{2}$	8-75-15	$1\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{1}{5}$
$8\frac{1}{2}$	$4\frac{1}{5}$	$4\frac{1}{5}$	12	7	$5\frac{2}{3}$	$3\frac{1}{10}$	$2\frac{1}{4}$	7-71-11	$1\frac{1}{2}$	$1\frac{1}{4}$	$2\frac{1}{10}$
4	$4\frac{1}{5}$	$4\frac{2}{3}$	11	7	$4\frac{1}{4}$	2	$2\frac{1}{2}$	7-67-12	$1\frac{3}{5}$	$1\frac{3}{5}$	3
$3\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{2}{3}$	11	7	$4\frac{1}{10}$	2	$2\frac{1}{2}$	8-67-11	$1\frac{1}{2}$	$1\frac{1}{5}$	$2\frac{1}{5}$

Type.—No. 48126, U.S.N.M.

2. CATOSTOMUS LATIPINNIS (Baird & Girard).[2]

Five specimens of this species were taken in the Salt River at Tempé, Arizona. It very closely resembles *C. discobolus* of Green River and Grand River (both tributaries of the Colorado), but differs in having larger scales, more dorsal rays, and a more slender caudal peduncle, as well as a more anterior insertion of the dorsal fin. These two fishes have been confused in Jordan & Evermann's "Fishes of North and Middle America." Their description of *C. latipinnis* is taken from specimens of *C. discobolus* from Green River and Grand River, and from notes on Baird & Girard's type of *C. latipinnis*. Following is a description and table of measurements based on our specimens.

Head $4\frac{1}{2}$ in length, depressed and flat above. Eye high up and small, 5 to 7 in head, 3 to $3\frac{1}{2}$ in snout, $2\frac{1}{3}$ to $2\frac{3}{4}$ in interorbital space. Interorbital width $2\frac{2}{5}$ in head. Depth about $5\frac{1}{2}$; least depth of caudal peduncle $4\frac{1}{2}$ in head, $3\frac{1}{2}$ in its own length; greatest depth of head $1\frac{1}{5}$ in its length; depth below lower edge of orbit 3 in head. Dorsal 14 or 15; anal 7. Scales 19 or 20—89 to 102—16 to 18, 46 to 50 transverse rows in front of dorsal fin. Fins very large, the dorsal with its upper margin concave; ventrals and pectoral rounded; dorsal as long as its longest ray, $1\frac{1}{10}$ in head, its last ray a little less than half the length

[1] Fishes of North and Middle America, 1896, p. 170.

[2] Not *Catostomus latipinnis* Jordan, Bull. United States Fish Commission, 1889, p. 26, which = *C. discobolus* Cope.

of the first ray; first dorsal nearer tip of snout than base of caudal; ventrals not reaching quite to vent, $1\frac{2}{5}$ in head. Muzzle not projecting; about six rows of short thick papillæ on upper lip, the smallest above; lower lip large, incised to its base, with about twelve rows of short thick papillæ, which are quite small posteriorly; distance from front of upper lip to back of lower $1\frac{1}{2}$ in snout; jaws with a slight cartilaginous sheath. Width of preorbital a little less than half its length. Reaching a length of 2 feet. Gila Basin.

This species has been recorded from the following places: Rio San Pedro, Gila Basin (type locality), by Baird & Girard; Fort Thomas, Gila River, by Kirsch.

Table of measurements.

Length in inches.	D.	A.	Scales.	Scales in front of dorsal.	Depth.	Head.	Eye.	Interorbital.
24	14	7	20–90–16	48	$5\frac{1}{3}$	$4\frac{1}{4}$	7	$2\frac{3}{5}$
10	15	7	20–102–17	50	$5\frac{3}{4}$	$4\frac{1}{4}$	6	$2\frac{3}{5}$
8	15	7	19–89–16	46	$4\frac{3}{4}$	$4\frac{1}{4}$	6	$2\frac{3}{5}$
$5\frac{1}{2}$	14	7	19–95–18	48	$5\frac{1}{2}$	$4\frac{1}{4}$	5	$2\frac{3}{5}$

3. CATOSTOMUS DISCOBOLUS Cope.

Catostomus discobolus Cope, Hayden's Geol. Surv. Wyom., p. 435, 1870.

The following description is based on specimens taken at Green River, Wyoming, by Doctor B. W. Evermann, of the United States Fish Commission. The species was not found by Doctor Gilbert in the Lower Colorado, where it is probably replaced by *C. latipinnis*. The description is included here in an attempt to clear up the confusion existing between the two species. Our specimens, although from the type locality, do not agree exactly with the original description, the differences being probably due to the very small size of the type.

Head $3\frac{1}{5}$ to $4\frac{1}{2}$. Depth about $5\frac{1}{4}$. Eye small, high up, $5\frac{1}{2}$ to 6 in head, $2\frac{3}{5}$ in snout, $2\frac{3}{5}$ in interorbital space. Interorbital space $8\frac{1}{2}$ in head. Width of preorbital less than half its length. Least depth of caudal peduncle $2\frac{1}{2}$ in its length, 2 in length of head; greatest depth of head $1\frac{3}{5}$ in its length, depth from lower edge of orbit $3\frac{1}{4}$ in head. Muzzle projecting slightly beyond upper lip. Upper margin of dorsal very slightly concave, the length of its base $1\frac{1}{3}$ in the longest ray. $1\frac{1}{2}$ in length of head; last ray half length of first; front of dorsal midway between tip of snout and base of caudal; ventral $1\frac{1}{10}$ in head, rounded, not reaching quite to vent. Mouth as in *C. latipinnis*, except that the posterior tubercles on lower lip are long and not nearly so closely set, there being nine or ten rows; jaws with a slight cartilaginous pellicle.

Specimens from Delta, Colorado, collected by Jordan & Evermann, differ slightly from Green River specimens in size of scales, as will appear from the following tables of measurements:

Measurements of Catostomus discobolus, Green River, Wyoming.

Length in inches.	D.	A.	Scales.	Scales in front of dorsal.	Depth.	Head.	Eye.	Inter-orbital.
8	12	7	20–101–18	56	4 1/4	3 1/2	6 1/2	2 1/4
8	12	7	19–108–20	58	5 1/2	4 1/4	5 1/2	2 1/2
5 1/2	12	7	21–111–21	60	4 1/2	4	5 1/2	2 1/2
5 1/2	13	7	20–106–18	62	5 1/2	4 1/2	5 1/2	2 1/2
5 1/2	13	7	19–101–17	52		4	5	2 1/2
5	13	7	–109–	63		4	3 1/2	2 1/2
6 1/2	13	7	21–106–18	58				
5 1/2	12	7	18–113–20	63				
6	13	7	19–107–18	59				
5	12	7	21–108–18	59				
5 1/2	13	7	20–104–17	57				

Measurements of Catostomus discobolus, Delta, Colorado.

Length in inches.	D.	A.	Scales.	Scales in front of dorsal.	Depth.	Head.	Eye.	Inter-orbital.
8	12	7	25–128–22	65	4 3/4	4	5 3/4	2 3/4
7	12	7	24–118–23	65	4 1/2	4	5 1/2	2 1/2
6 1/2	12	7	23–116–22	63	4 3/4	4	5 1/2	3 1/2
6	12	7	21–113–22	62	5	3 1/2	5 1/2	2 3/4
5 1/2	13	7	22–112–22	60	5	4	5 3/4	2 3/4
5 1/4	12	7	22–116–20	65	5 1/4	4	5	2 1/4

4. CATOSTOMUS GILA Kirsch.

Eleven specimens were taken at Tempé and agree with the original description in everything except the number of papillæ on the lips. Our specimens have six irregular rows on the upper lip and eight or nine on the lower lip.

Table of measurements.

Length in inches.	D.	A.	Scales.	Scales in front of dorsal.	Depth.	Head.	Eye.
6	12	7	11–58–9	29	4 1/2	3 1/2	5
5 3/4	12	7	10–59–10	30	4 1/2	3 1/2	4 2/3
6	12	7	10–58–10	31	4 1/2	4	5
5	12	7	11–59–11	30	4	3 3/4	4 2/3
8	12	7	11–59–11	31	4 1/4	4 1/2	5
4 1/2	12	7	9–59–12	31	4 1/2	4	5
5 3/4	12	7	11–59–11	31	4 1/2	3 1/2	4 1/2
5	13	7	11–59–11	32	4 1/2	4	4 1/2
5	12	7	12–60–14	31	4	4	4 1/2
4 1/2	12	7	12–58–12	32	4	3 3/4	4 1/2
4	12	7	12–60–12	32	3 3/4	3 3/4	4 1/4

5. XYRAUCHEN CYPHO Lockington.

Eight specimens of this species were preserved. It was found extremely abundant at Yuma and at all points below as far as the Horseshoe Bend, and in Hardee's Colorado. A table containing measure-

ments and other data is given below. The scales average smaller than those in the type specimen, and the majority have one more dorsal ray. The anal fin is not so deep. In the small specimens the nuchal hump forms a sharp keel from dorsal to nape, the keel being but little elevated. *Xyrauchen uncompahgre*, described by Jordan & Evermann from a single small specimen, agrees with the young of *X. cypho* except in the number of dorsal rays, there being but twelve rays in the dorsal of *X. uncompahgre*. These two will probably be found to be the same species.

Measurements of Xyrauchen cypho.

Length in inches.	D.	A.	Scales.	Depth.	Head.	Eye.	Least depth of C. ped. in length.	Locality.
11¾	14	7	16–78–17	4½	4	6½	11½	Yuma, Ariz.
12½	15	7	17–87–17	4	4	6 3/10	11½	Do.
9½	15	7	23–87–16	4½	4	6	11½	Do.
8½	15	7	19–87–17	4½	4	5 7/10	11½	Do.
6½	15	7	18–83–15	3½	3½	5½	11	Do.
11	14	7	15–78–18	3 7/10	3⅜	5½	11¼	Tempe, Ariz.
15¼	15	7	19–80–16	3½	3⅝	6½	12¼	Do.
18½	14	7	16–79–17	4 1/10	3⅝	6½	13½	Horseshoe Bend.

Family CYPRINIDÆ.

6. PTYCHOCHEILUS LUCIUS Girard.

Several small specimens from the Colorado River at Yuma, and at the Horseshoe Bend near its mouth. They do not differ from the original description. The species is abundant in the Gila and Lower Colorado, and is the most highly prized of all the native fishes. It is frequently taken reaching a length of from 4 to 5 feet, and is universally known as the "Colorado Salmon." It is reported as abundant also in the headwaters of the Colorado in Utah, Colorado, and Wyoming.

7. GILA ELEGANS Baird & Girard.

Specimens of this species were taken in the Colorado and Gila rivers at Yuma, in Salt River at Tempé, and in the Lower Colorado at the Horseshoe Bend. It is most abundant in the larger river channels. Our specimens are from 4 to 15 inches long. The head is 4½ in the length, the depth 4½ to 5½. Diameter of eye 4 to 7½ in head. Scales 21 to 24—77 to 88—10 to 12. Dorsal 10 (9 to 11); anal 10 (9 to 11). Teeth 2–5–4–2.

In the larger specimens the pectorals reach a little past origin of ventrals, while in the smaller ones the ventrals are not reached by the pectorals. The caudal peduncle is longer in the adults and the upper profile of the head is very concave, while in the young it is nearly straight.

8. GILA ROBUSTA Baird & Girard.

Gila robusta Baird & Girard, Proc. Ac. Nat. Sci. Phila., 1853, p. 368.—Girard, Pac. R. R. Surv., 1858, X, p. 285.—Jordan & Gilbert, Synopsis, 1883, p. 228.—Jordan, Bull. U. S. Fish Commission, IX, 1889, p. 27.—Jordan & Evermann, Fishes of N. and M. A., 1896, p. 227.

Leuciscus robustus Günther, Cat., 1868, VII, p. 241.

Gila pulchella Baird & Girard, Proc. Ac. Nat. Sci. Phila., 1851, p. 29.

Gila grahami Baird & Girard, Proc. Ac. Nat. Sci. Phila., 1853, p. 389.—Girard, U. S. and Mex. Bound. Surv., Zool., 1859, p. 61.—Jordan & Gilbert, Synopsis, 1883, p. 228.

Leuciscus grahami Günther, Cat., 1868, VII, p. 242.

Gila gracilis Jordan & Gilbert, Synopsis, 1883, p. 229.

Very abundant in Salt River at Tempé, where it exceeds in numbers all other species. It was not taken in the Colorado, and is probably more abundant in smaller streams than in the main river channels. Our specimens show a great range of variation in the size of the scales, as can be seen from the following table. The two specimens having eighty-three and one hundred and ten scales in the lateral line are probably abnormal. The larger specimens bear a striking resemblance to *Gila elegans*, and the younger ones are difficult to distinguish from *Leuciscus intermedius*. Compared with the latter, *Gila robusta* has slightly smaller scales and a slenderer caudal peduncle. The body is not so deep and its head is more slender. The scales below the lateral line are not specked with black.

This species is abundant throughout the entire Colorado River Basin. Owing to the close resemblance which this species bears to *Leuciscus intermedius*, the synonymy of the two has been greatly confused.

Measurements of Gila robusta, Tempé, Arizona.

D.	A.	Scales.	Rud. C. rays.	Least depth of C. ped. in length.	Length of C. ped. in length.	Head in length.	Eye in head.	Depth.	Length in inches.
9	9	24–93–11	10–11	16	4	$4\frac{3}{4}$	$5\frac{1}{2}$	5	14
9	9	24–105–10	10–11	13	$4\frac{3}{4}$	$5\frac{3}{4}$	$7\frac{1}{2}$	$4\frac{1}{2}$	$4\frac{1}{2}$
9	9	24–93–12	10–10	13	$4\frac{1}{2}$	$5\frac{3}{4}$	4	$4\frac{1}{2}$	$4\frac{1}{2}$
9	9	22–100–10	10–10	$11\frac{1}{2}$	5	$5\frac{3}{4}$	$5\frac{3}{4}$	$4\frac{1}{2}$	3
9	9	23–98–10	10–12	12	$4\frac{1}{2}$	$5\frac{3}{4}$	$5\frac{3}{4}$	5	3
9	9	24–83–11	10–10	12	$4\frac{1}{2}$	$5\frac{1}{2}$	$5\frac{1}{2}$	$4\frac{1}{2}$	3
9	9	24–110–12	10–10	12	$4\frac{1}{2}$	$5\frac{3}{4}$	$5\frac{1}{2}$	$4\frac{1}{2}$	3
9	9	25–102–13	10–10	12	$4\frac{1}{2}$	$5\frac{3}{4}$	$5\frac{1}{2}$	$4\frac{1}{2}$	3
9	9	25–94–12	10–10	12	$4\frac{1}{2}$	$5\frac{3}{4}$	$5\frac{1}{2}$	$4\frac{1}{2}$	3
9	9	24–100–12	9–9	13	$4\frac{1}{2}$	$5\frac{3}{4}$	$5\frac{1}{2}$	$4\frac{1}{2}$	3
9	9	24–99–11	11–10	$12\frac{1}{2}$	$4\frac{1}{2}$	$5\frac{3}{4}$	$5\frac{1}{2}$	$4\frac{1}{2}$	3

9. LEUCISCUS INTERMEDIUS Girard.

Gila gracilis Baird & Girard, Proc. Ac. Nat. Sci. Phila., 1853, p. 369 (preoccupied in *Leuciscus*).—Girard, Pac. R. R. Surv., X, 1858, p. 287.—Jordan & Gilbert, Synopsis, 1883, p. 229.

Gila gibbosa Baird & Girard, Proc. Ac. Nat. Sci. Phila., 1854, p. 28, Rio Santa Cruz (preoccupied in *Leuciscus*).

Tigoma gibbosa GIRARD, Proc. Ac. Nat. Sci. Phila., 1856, p. 207.—GIRARD, U. S. Mex. Bound. Surv., Zool., 1859, p. 61.

Tigoma intermedia GIRARD, Proc. Ac. Nat. Sci. Phila., 1856, p. 206.

Squalius intermedius JORDAN & GILBERT, Synopsis, 1883, p. 238.

Leuciscus intermedius JORDAN & EVERMANN, Fishes of N. and M. A., 1896, p. 235.

Gila nigra COPE, Zoöl. Wheeler's Expl. W. 100th Mer., V, 1875 (1876), p. 663.

Squalius nigra JORDAN & GILBERT, Synopsis, 1883, p. 239.

Leuciscus niger JORDAN & EVERMANN, Fishes of N. and M. A., 1896, p. 235.

Squalius lemmoni ROSA SMITH, Proc. Cal. Ac. Sci., 1884, p. 3.

Leuciscus zunuensis GÜNTHER, Cat., VII, 1868, p. 241. Substitute for *L. gracilis*, preoccupied.

Numerous specimens about 3 inches in length were obtained at Tempé, and at Chino, Arizona. It is more robust than the young of *Gila robusta*, and has the scales a little larger, those below the lateral line specked with black. The specimens taken at Chino differ from the Tempé specimens in the slightly deeper caudal peduncle. This species varies greatly in its scale formula, as can be seen from the accompanying table. Like *G. elegans* and *G. robusta* it is found throughout the Colorado River Basin. It has been commonly known as *L. niger*, but there is no reason to consider the two nominal species distinct. *Squalius lemmoni* is described as having the scales 68, but in one of the types we find them 21–75–10. It may therefore well belong here.

Table of measurements.

D.	A.	Scales.	Rud. C. rays.	Least depth of C. ped. in length.	Length of C. ped. in length.	Head in length.	Eye in head.	Depth.
8	8	24–84–10	10–10	12½	4⅓	3⅓	3⅓	4⅓
9	9	18–91–10	9–10	12	4⅛	4	3⅜	4⅓
8	8	18–83–10	10	12½	4⅓	3⅜	3¼	4
8	8	18–92–10	10–10	12½	4¼	3⅜	3¼	4⅓
9	8	18–94–10	10–10	12	4½	3⅜	3⅓	4⅔
9	8	18–92–10	10–10	11½	4¼	3⅜	3½	4⅓
8	8	19–82–10	10–10	11½	4¼	3½	3½	4
8	8	20–95–10	10–10	10	4½	3½	3½	3½
8	8	18–87–9	10–10	10¼	4½	5⅜	3½	3⅔
8	9	19–87–10	10–10	12	4⅓	3½	3½	4½
9	8	20–79	10–9	11	4⅓	3⅝	3½	4½
8	8	20–87–11	10–10	11	4⅓	3⅝	3½	3⅔
8	8	18–80–10	10–10	11½	4⅓	3⅜	3⅜	4
9	8	19–87–10	9–9	11	4⅓	3½	3⅜	4
9	9	19–87–10	10–10	11	4¼	3⅜	3⅜	4
8	8	18–83–10	10–10	11	4⅛	3⅜	3⅜	4⅓
8	8	20–82–10	10–10	10½	4⅓	3½	3¼	4
8	8	21–76–10	10–10	10½	4¼	3½	3½	4⅓

10. TIAROGA COBITIS Girard.

(Plate XXXVII.)

Several specimens of this interesting species were obtained at Chino, Arizona, from a tributary of the Rio Verde, which belongs to the Gila Basin. It is of unusual interest, not having been taken since the discovery of the types in 1851. Girard's specimens were from the Rio San Pedro, a tributary of the Gila.

Head 4 to 4½; depth 5⅓: eye small, 4 to 4½ times in the head, 1½ in the snout, ¾ interorbital space. The snout is contained 3 to 3½ times in the length of the head. D. 8; A. 7. Isthmus very wide, 2 in head.

In five specimens examined, four have the teeth 1, 4–4, 1, and one 2, 4–4, 1, without grinding surface. The lateral line is median and about straight, with seventy pores to base of caudal fin. The belly and the back in front of the dorsal are destitute of scales. Least depth of caudal peduncle $2\frac{1}{3}$ in head. Mouth very small, terminal, oblique; the lips fleshy. The maxillary is without barbels and is contained $1\frac{1}{3}$ in snout. The mandible is contained a little less than three times in head; premaxillary not protractile. The pectoral fins reach two-thirds distance to ventrals. The ventrals reach the front of the anal. The third ray of the anal is the longest, $2\frac{2}{5}$ in head. The front of the dorsal is slightly behind the origin of the ventrals, and considerably nearer the base of the caudal than the tip of the snout. The edge of the dorsal fin is straight, its second ray longest, $1\frac{2}{5}$ in head, its rudimentary rays not enlarged.

Color (in alcohol), pale gray or yellowish, mottled with reddish-brown on sides and back; a dark elongate black spot on base of middle caudal rays broadening posteriorly into a vertical bar, which follows the posterior outline of the caudal fin; this followed by a second and in some by a third fainter bar with lighter interspaces; a conspicuous white patch above and below caudal spot; there is a small but conspicuous white spot under the first rays of the dorsal and one under posterior end of dorsal, the two encroaching slightly on the fin; dorsal with two broad but faint dark bars parallel to its free edge. Length averages $2\frac{1}{2}$ inches.

11. AGOSIA OSCULA Girard.

About thirty specimens were obtained at Chino. This species is at once distinguished from the other species of *Agosia* in the Colorado Basin by its very small scales and its definite lateral band. We give here a description based on our specimens, as there is no good current description.

Head 4 in length; depth 4 to $4\frac{3}{4}$; eye 4; snout $3\frac{1}{4}$; scales 17 to 19–80 to 86–15 to 17; D. 8; A. 7; least depth of caudal peduncle $2\frac{1}{4}$ in head; teeth 1, 4–4, 1, hooked and with grinding surface. Body terete and rather elongate, the caudal peduncle not much compressed. The head tapers to an elongate but obtuse snout. The mouth is slightly oblique; the lips not fleshy; maxillary with a small barbel at its tip. Free margin of dorsal and anal straight. The front of the dorsal is slightly behind the origin of the ventrals and midway between the center of the orbit and the base of the middle caudal rays. Length of dorsal 2 in head; its longest ray $1\frac{1}{3}$ in head. The pectorals are short, reaching two-thirds distance to ventrals. The ventrals do not quite reach the front of the anal. Dusky olive above, silvery below; a definite dark lateral band about width of eye, expanding at the base of the caudal and narrowing abruptly to a faint caudal spot. In some specimens the sides are slightly mottled with darker. Our specimens are about 2 inches in length.

AGOSIA COUESII Yarrow.

Nine specimens were taken at Tempé, and do not agree perfectly with current descriptions. The following description is based on our specimens: Head $3\frac{3}{4}$ to 4; depth 4 to 5; eye 4 to $4\frac{1}{2}$ in head, 3 in snout; D. 8; A. 7; scales 14 to 17–70 to 77–10 or 11; teeth 1 or 2, 4–4, 2 or 1. Body stout, the head long and conical, the snout pointed. Mouth broad, inferior, horizontal, the lips fleshy. Width of isthmus 10 to 13 times in length of fish. Eye small and high up. Caudal peduncle deep and compressed, its least depth contained $2\frac{1}{5}$ in the head. Fins all large; the pectorals reaching front origin of ventrals; the ventrals reaching past front of anal; free edge of dorsal and anal slightly concave; front of the dorsal in advance of origin of ventrals and half way between base of middle caudal rays and nostril. The length of the dorsal is contained $1\frac{9}{10}$ in head; its longest ray $1\frac{1}{10}$ in head. The longest ray of the anal is contained $1\frac{1}{5}$ in the head. Color dark above and on sides, mottled slightly with black; pale below; fins all plain; no lateral band or caudal spot. Our largest specimen, $2\frac{1}{2}$ inches long.

Measurements of Agosia couesii.

Head.	Depth.	Eye.	Snout.	Interorbital.	D.	A.	Scales.	Teeth.
$3\frac{3}{4}$	$4\frac{1}{2}$	$4\frac{1}{2}$	3	$4\frac{1}{4}$	8	7	15–72–11	1, 4
$3\frac{3}{4}$	4	$4\frac{7}{10}$	3	4	8	7	16–77–11	2, 4–4, 2
$3\frac{3}{4}$	5	4	3	4	8	7	17–77–10	1, 4–4, 2
$3\frac{3}{5}$	$4\frac{1}{4}$	4	3	4	8	6	15–72–11	4–4, 1
$3\frac{9}{10}$	$4\frac{1}{4}$	4	3	$4\frac{1}{4}$	8	7	15–73–10	3, 3–4, 1
$3\frac{3}{5}$	$3\frac{3}{5}$	4	$2\frac{9}{10}$	$4\frac{1}{4}$	8	7	16–73–11	2, 4–4, 1
4	4	$4\frac{3}{5}$	$2\frac{2}{5}$	4	8	7	15–67–11	1, 4
$3\frac{3}{4}$	5	4	3	4	8	7	14–73–10	4, 1
$3\frac{3}{4}$	4	4	3	4	8	7	14–69–10	1, 4–4, 1

13. AGOSIA CHRYSOGASTER Girard.

Only one specimen was obtained at Chino.

Head 4 in length; depth $4\frac{1}{2}$; eye $3\frac{1}{2}$; snout $3\frac{1}{2}$; interorbital 4; D. 8; A. 7; scales 16–80–14; teeth 4–4, without grinding surface.

14. PLAGOPTERUS ARGENTISSIMUS Cope.

A few specimens were procured in the mouth of the Rio Gila at Yuma, and others in the Salt River at Tempé. The species had been reported hitherto only from the San Luis Valley in western Colorado. Our specimens do not differ from the types, with one of which they have been compared.

Head 4 in length; depth 5; eye 4 in head, $1\frac{1}{3}$ in snout. $1\frac{1}{2}$ in interorbital space; D. 11, 7; anal 10; teeth 2, 5–4, 2, without grinding surface. Length $2\frac{1}{2}$ inches. Least depth of caudal peduncle $2\frac{1}{2}$ in head, its length $1\frac{1}{2}$ in head. Preorbital not quite as long as eye.

Front of dorsal behind origin of ventrals, and very slightly nearer base of caudal than tip of snout; first dorsal spine not quite as long

as head, curved and slightly longer than the second spine, which is received into a longitudinal groove in the first; back of these the rays are thickened and ossified for a little over half their length, their tips articulated and issuing from the tips of the spines; length of anal 1½ in head, with one rudimentary and ten developed rays; pectoral reaching ventrals, their rays slightly ossified at base; ventrals reaching vent, the first ray thickened and ossified for half its length, the remaining rays developed as six sharp flat spines which fold together like a fan when the fin is closed. From the posterior side of each spine and from just below its tip an articulated ray issues, the first extending beyond its spine for one-fourth length of latter, the others successively shorter; the last scarcely projecting; osseous portion of last ray joined for its whole length by a membrane to the abdomen; caudal forked for half its length.

Mouth moderate, horizontal, lower jaw included; maxillary extending to front of orbit, with a small barbel at its tip; length of mandible equal to distance from tip of snout to center of orbit, the space between them papillose and spongy. Nasals elevated, the muzzle slightly depressed. Lateral line deflected opposite the dorsal, not quite complete, about thirty-five pores to opposite front of anal; rudiments of scales can be seen above lateral line, more numerous in front of dorsal Color pure silvery, yellowish beneath: dorsal region very finely punctulate; peritoneum and gill cavity light silvery.

15. MEDA FULGIDA Girard.

This species was found extremely abundant in the upper course of the Rio Verde, near Chino, Arizona, and was taken also in the Salt River at Tempé. It had previously been taken only in the Rio San Pedro. Following is a description of our specimens:

Head 4 in length; depth 5½; eye 3½ in head, equal to snout and to interorbital width. Least depth of caudal peduncle 3½ in head, equaling diameter of eye. D. II, 6, counting last divided ray as one; A. 8, 9, or 10, usually 9. Front of dorsal behind origin of ventral considerably nearer base of caudal than tip of snout. The character of dorsal rays is the same as in *Plagopterus argentissimus*, the first spine curved nearer its tip than in the latter, the second spine shorter than the first; first spine 1¾ in head, longer than base of fin, which is contained twice in head; anal 1⅘ in head; pectorals reach two-thirds distance to vent; the rays osseous at base; ventrals reaching almost to vent, and structurally the same as in *P. argentissimus;* caudal forked for a little less than half its length, the lobes rounded. Mouth moderate, terminal, slightly oblique, the lower jaw included; mandible reaching vertical from center of pupil; maxillary reaching front of pupil, without barbel. The teeth were examined in ten specimens, eight having them 1, 4–4, 1; one 2, 4–4, 1, and one 1, 4–5, 1. Lateral line gradually descending backward to beneath the dorsal, where it bends rather